Editorial

Space-Ruled Ecological Processes: Introduction to the Special Issue on Spatial Ecology

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This special issue explores most of the scientific issues related to spatial ecology and its integration with geographical information at different spatial and temporal scales. Papers are mainly related to challenging aspects of species variability over space and landscape dynamics, providing a benchmark for future exploration on this theme.

The need for a spatial view in Ecology is a fact. Dealing with ecological changes over space and time represents a long-lasting theme, now faced by means of innovative techniques and modelling approaches (e.g., Chaudhary et al. [1], Palmer [2], Rocchini [3]).

This special issue explores some of them, with challenging ideas facing different components of spatial patterns related to ecological processes, such as: (i) species variability over space [4–11]; and (ii) landscape dynamics [12,13].

Concerning biodiversity variability over space, key spatial datasets are needed to fully investigate biodiversity change in space and time, as shown by Geri et al. [7], who carried out innovative procedures to recover and properly map historical floristic and vegetation data for biodiversity monitoring. Furthermore, Dubois et al. [6] describe in detail one of the most important integrated observatory (Digital Observatory for Protected Areas, DOPA) to mobilize and use biodiversity data and spatial datasets, to asses the ecological status of protected areas.

Once such data are gathered and integrated in a proper manner, Species Distribution Modelling is certainly one of the most powerful techniques used in ecology in which the geographical component makes the difference. In this special issue, Costa et al. [5] show that species misidentification might severely impact species distribution models once dealing with presence-only data.

Besides identification problems, the model being used can lead to different results. Rodriguez de Rivera and Lopez-Quilez [10] propose a comparison among different species distribution models for forest inventories, promoting high flexibility models like additive models. In this view, one of the best models to study the spatial variability of species and communities is presented in this special issue by Leitao et al. [8], who demonstrate the power of Sparse Generalized Dissimilarity Modelling, by also providing a detailed description of the newly published R package `sgdm`.

On the other side, species richness patterns are also considered, facing water-energy dynamics on terrestrial mammal and amphibian species over wide geographical regions [11]. Beside the water-energy concept, remotely sensed spectral indices are used in this special issue to estimate different attributes of tropical forest vegetation under different anthropogenic impact [4].

Species distribution modelling-like techniques might also be applied to the spread of diseases threatening key species. For instance, Makori et al. [9] predict the spatial distribution of key honeybee pests in Kenya.

In some cases, species-related data on distributions are not available. In such a case, relying on the variability of landscape-scale spatial patterns derived from remote sensing or geographical data (e.g., Rocchini and Di Rita [14]), might represent a powerful indicator to estimate the current status of ecosystems, considering different issues such as ecosystem mapping [12] or improved biogeography-based optimisation [13].

This special issue gather papers from the best researchers in the field who properly faced different aspects of spatial ecology, including problems and uncertainties which are in most cases neglected in some ecological studies, and have been demonstrated to severely impact final results.

I hope that the readership of the ISPRS International Journal of Geo-Information will enjoy the scientific effort put to properly face and find solutions to very different issues of spatial ecology.

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